

AMENDMENTS

IN THE CLAIMS

Please amend the claims as follows. As required by 37 C.F.R. 1.121(c), the amended claims are provided here in clean, unmarked form, and in marked form in the attached APPENDIX.

Claim 3 has been cancelled in the previous response without prejudice or disclaimer and claim 1 is now twice amended.

Please amend the claims to read as follows:

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1. (Twice amended) A device comprising;
a waveguide;
a finline substrate positioned within the waveguide;
a tunable dielectric layer positioned on the finline substrate, wherein the tunable dielectric layer comprises a barium strontium titanate (BSTO) composite containing materials that enable low insertion loss and effective phase tuning at non-chilled temperatures, including room temperature;
a first conductor positioned on the tunable dielectric layer; and
a second conductor positioned on the tunable dielectric layer, the first and second conductors being separated to form a gap having a minimum width ranging from 2

micron to 50 micron.

2. (Once amended) The device according to claim 1, wherein:

the gap extends from a first end of the tunable dielectric layer to a second end of the tunable dielectric layer;

the gap includes a first end, a center portion and a second end; and

the gap includes exponentially tapered portions adjacent to said first and second ends.

3. (Cancelled)

4. (Once amended) The device according to claim 1, further comprising:

a voltage source for applying a control voltage between the first conductor and the second conductor.

5. (Once amended) The device according to claim 1, wherein the second conductor forms an RF ground.

6. (Once amended) The device according to claim 1, wherein the second conductor comprises:

an RF choke.

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7. (Once amended) The device according to claim 1, wherein the waveguide includes first and second sections, and the tunable phase shifter further comprises:

a first conductive plate positioned between the first and second sections of the waveguide; and

a second conductive plate positioned between the first and second sections of the waveguide, the first conductive plate being insulated from the waveguide and the second conductive plate being electrically connected to the waveguide.

8. (Once amended) The device according to claim 7, further comprising an impedance matching section formed by a gap between the first and second conductive plates.

9. (Once amended) The device according to claim 8, wherein the impedance matching section comprises:

an exponentially tapered gap between the first and second conductive plates.

10. (Once amended) The device according to claim 1, wherein:

the first conductor is insulated from the waveguide and includes an RF ground;

and

the second conductor is electrically connected to the waveguide.

11. (Once amended) The device according to claim 10, further comprising an impedance matching section formed by a gap between the first and second conductors.

12. (Once amended) The device according to claim 11, wherein the impedance matching section comprises:

an exponentially tapered gap between the first and second conductors.

13. (Once amended) The device according to claim 1, wherein the tunable dielectric layer comprises a material selected from the group of:

barium strontium titanate, barium calcium titanate, lead zirconium titanate, lead lanthanum zirconium titanate, lead titanate, barium calcium zirconium titanate, sodium nitrate, KNbO_3 , LiNbO_3 , LiTaO_3 , PbNb_2O_6 , PbTa_2O_6 , $\text{KSr}(\text{NbO}_3)$, $\text{NaBa}_2(\text{NbO}_3)_5$, KH_2PO_4 , and combinations thereof.

14. (Once amended) The device according to claim 1, wherein the tunable dielectric layer comprises a barium strontium titanate (BSTO) composite selected from the group of:

BSTO-MgO, BSTO-MgAl₂O₄, BSTO-CaTiO₃, BSTO-MgTiO₃, BSTO-MgSrZrTiO₆, and combinations thereof.

15. (Once amended) The device according to claim 1, wherein the tunable dielectric layer comprises a material selected from the group of:

Mg₂SiO₄, CaSiO₃, BaSiO₃, SrSiO₃, Na₂SiO₃, NaSiO₃-5H₂O, LiAlSiO₄, Li₂SiO₃, Li₄SiO₄, Al₂Si₂O₇, ZrSiO₄, KAlSi₃O₈, NaAlSi₃O₈, CaAl₂Si₂O₈, CaMgSi₂O₆, BaTiSi₃O₉ and Zn₂SiO₄.

16. (Once amended) The device according to claim 1, wherein the tunable dielectric layer comprises:

an electronically tunable dielectric phase and at least two metal oxide phases.

17. (Once amended) The device according to claim 1, wherein the tunable dielectric layer has a dielectric constant at zero bias voltage ranging from 30 to 2000.

18. (Once amended) The device according to claim 1, wherein the a finline substrate comprises:

a low loss, low dielectric material.